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Podcasts as an integral part of free open access medical education

Os podcasts como parte integrante da educação médica de acesso aberto e gratuito

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ABSTRACT

Introduction: Podcasts are audio broadcasts distributed over the internet that can be consumed through various platforms. From students to independent clinicians, the profile of medical podcast users is varied and a richer understanding of this user is essential for effective podcast development.

Objective: To review the current literature on the use of podcasts as a health education tool and to understand the stages involved in preparing a medical podcast.

Methods: The study is a narrative review developed through research in databases carried out at Unichristus University, in the city of Fortaleza-CE. An analysis of articles on podcasts or data on the prevalence of use, production or results of the use of podcasts for health education purposes was performed. A screening was performed by reading the abstracts and titles of 165 articles found in the Medline database, using the keywords 'Podcasts' and 'medical education', which resulted in 23 articles that met the inclusion criteria.

Results: Based on the content found in the literature, the review was divided into seven categories: formats, episode duration, activities carried out while listening to a podcast, learning assessment, suggestions, developing a medical podcast and the podcast as a complementary teaching tool.

Conclusion: the podcast is considered a promising medium of communication as a complementary tool to the traditional teaching methods, and educators should focus on developing evaluation processes for this technology, refining evidence-based guidelines for creating new podcasts.

Keywords: podcast, education, medical, review.

RESUMO

Introdução: *Podcasts são transmissões de áudio distribuídas através de internet e podem ser consumidas por meio de plataformas variadas. De estudantes a clínicos independentes, o perfil de quem consome podcast médico é variado e uma compreensão mais rica deste usuário é essencial para desenvolvimento eficaz do podcast.*

Objetivo: *Revisar a literatura atual sobre uso do podcast como ferramenta de educação médica e entender sobre as etapas de elaboração de um podcast médico.*

Métodos: *O estudo trata-se de uma revisão narrativa desenvolvida através de pesquisa em bases de dados realizada na Universidade Unichristus, na cidade de Fortaleza-CE. Foi realizada análise de artigos sobre podcast ou com dados sobre prevalência de uso, produção ou resultados do uso de podcasts para fins de ensino médico. Foi feita triagem por resumo e título de 165 artigos encontrados na base de dados no Medline com as palavras-chave Podcasts e educação médica, que resultou em 23 artigos que preencheram os critérios de inclusão.*

Resultados: *A partir do conteúdo encontrado na literatura, a revisão foi dividida em sete categorias: formatos, duração do episódio, atividades realizadas enquanto se escuta um podcast, avaliação do aprendizado, sugestões, desenvolvendo um podcast médico e o podcast como ferramenta de ensino complementar.*

Conclusão: *O meio é considerado promissor como ferramenta complementar aos métodos tradicionais de ensino, devendo os educadores se concentrarem no desenvolvimento de processos de avaliação desta tecnologia, refinando diretrizes baseadas em evidências para criação de novos podcasts.*

Palavras-chave: *podcast, educação, médica, revisão.*

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INTRODUCTION

In 2004, the term "podcast" was first used by the British newspaper The Guardian, and they have been growing in popularity ever since[1]. Requiring only a computer or a smartphone connected to the Internet, podcasts are easily accessible[2].

Podcasts are defined as audio broadcasts (or audio with visual enhancements) that are distributed over the Internet and can be consumed via a variety of platforms such as websites and handheld applications[2].

Cadogan et al. reports that podcasts are on the rise in medical education and continuing health education[3]. According to Little et al., in 2019, there were 200 medical podcasts available online, covering 19 specialties and a total of 13,839 episodes[4,5].

In this context, Malecki et al. recognizes that the growing popularity of podcasts in the era of open access health education has led to a demand for research to evaluate these materials, so a better understanding of the consumer of this technology for health education purposes is essential for effective *podcast* development[6].

In this narrative review, the topic was divided into the categories and subcategories shown in Table 1.

Free Open Access Medical Education - *FOAMed*

Free open access to medical education (FOAMed) has rapidly gained popularity among medical residents, as this group increasingly relies on the Internet for up-to-date medical information.

Free open access to medical education is the free availability of educational materials on various topics in medicine. As stated by Olusanya et al., the term emerged in 2012 at the International Conference on Emergency Medicine in Dublin. The following year, articles discussing the use of social media in health education began appearing in mainstream journals[7].

Podcasts have become an integral part of the free and open access to medical education. Podcasts and blog posts are increasingly being used in health education. Both are inexpensive to produce, easy to distribute and offer great portability, and there is some evidence that these types of media offer better student engagement when compared to traditional lectures[8,9].

FOAMED encompasses a continually expanding database of resources for health education, such as podcasts, blog posts, videos, and Twitter feeds. A robust culture has grown up around this idea. Studies suggest that FOAMED resources can aid medical students in knowledge acquisition and retention in combination with traditional resources[8,10].

The low cost, accessible production tools, rapid distribution and general appeal of podcasts have made them more common in health education. Podcast production requires, at least, a computer, a microphone and recording and editing software, as well as online hosting and distribution, provided free of charge through certain internet portals or available at low cost[2,11].

Podcasts

According to Little et al, podcasts are digital audio files made available on the Internet for download to a computer or mobile device, usually available in episodes. Patrick et al. define them as episodic digital audio recordings used to communicate knowledge through the use of files that were downloaded and distributed online[4,5,12].

Singh et al. report that the use of a "really simple distribution" communication protocol to send these audio or

Table 1. Division of the main topic into categories and subcategories for better organization and understanding of the covered topics.

Categories	Subcategories
FOAMed[(1)]	
Podcasts	Formats
	Episode Length
	Activities performed while listening to a podcast
	Learning Assessment
	Suggestions
	Developing a medical *podcast*
	The podcast as a complementary teaching tool

[1]FOAMed: Free open access to Medical education
Prepared by the authors.

video files directly to subscribers is what separates podcasts from other means of electronic information dissemination[11].

According to a survey conducted by Little et al., a 2018 trade report estimated that 124 million people listen to podcasts. Considering the Apple Podcast platform alone, there are over 500,000 active podcasts in 100 languages, exemplifying the diverse reach of podcasting for disseminating information and entertainment[4,5].

For decades, podcasts have been used not only for personal enjoyment but also for the dissemination of knowledge[4]. Students have the advantage of accessing podcasts through devices of their choice and using them anywhere and anytime, allowing students to learn at their own pace[13].

The use of audio recordings for health education has been documented in the literature as having taken place as early as 1968, when they were used for asynchronous learning in histology classes[14].

The use of podcasts in medical education has seen similar growth and depth to that of podcasting in general, with specific podcasts targeting almost every medical discipline and specialty[4]. In a study developed by Riddell et al., emergency medicine resident physicians reported using educational podcasts more frequently than books or journals[15].

The study by Little et al. in 2020, showed, in a google search, that emergency medicine, internal medicine and pediatrics had the most active podcasts. Neurosurgery was the only specialty that did not show any active podcasts. For dermatology, a total of 10 podcasts were found, nine of which were active[4,5].

Between 2002 and 2013, the number of podcasts in emergency medicine increased from 1 to 42, and many have become extremely popular. Seventy percent of emergency medicine residents said that podcasts were the most useful type of asynchronous education they used according to Wolpaw and Toy[9].

From students to independent clinicians, the profile of those who consume a medical podcast is very varied, and a better understanding of this user is essential for effective podcast development[16]. The review by Cho et al. shows that podcast use has been reported in a wide range of medical education fields, including medical students, medical residents, and attending physicians[2].

Cho et al. also found that the major medical journals (The New England Journal of Medicine, The Lancet, Journal of Clinical Oncology, Journal of the American Medical Association, Circulation) and journals in medical education (Medical Education, The Clinical Teacher) are producing podcasts[2]. The growing popularity of medical podcasts in the era of open access medical education**,** both in educational institutions and on an international scale by major journals, has demanded research to evaluate these materials[6].

The study by Oommen concluded that a substantial number of family medicine residents in Canada would like to watch a series of podcasts covering the topics for the specialty certification exam and would have high expectations of the content and technical quality[17].

According to Singh et al., studies have concluded that podcasts can be used to enhance the user's learning experience by providing short, succinct summaries of complex concepts, as review aids, or simply by providing the user with the ability to absorb contents at their own pace by exploiting the ability to pause the content[11].

Repeatability and convenience, are also cited in the review by Cho et al. as factors that have contributed to improved learning with podcasts[2]. The study by Malecki also highlights that the podcast is seen as a form of entertainment[6]. Participants in the study reported that they enjoy more those versions that combine wit and humor, giving them a sense of familiarity with the hosts. Just as Cho et al. mention the use of humor, personal anecdotes and the "personality" of a podcast as positive factors[2].

The purpose of this study is to review the current literature on the use of podcasts as a teaching tool in health education, as well as to guide quality indicators and the steps of developing a medical podcast, based on current scientific evidence.

METHODS

The literature review was performed through an online search using the MeSH terms "medical education" and "podcasts" on Medline (via Pubmed), on April 13, 2021. After screening the abstracts and titles of the 165 articles found in the database,23 articles that met the inclusion criteria were identified. The full texts were reviewed by all authors. Articles were included if they discussed a podcast or reported data on the prevalence of use, production, or outcomes of using audio podcasts for medical student education (at undergraduate, residency, continuing health education levels).

RESULTS

In the Podcast category, the content was divided into the following topics: formats, episode length, activities performed while listening to a podcast, learning assessment, suggestions, developing a medical podcast, and the podcast as a complementary teaching tool.

Formats

In the review by Cho et al., nineteen articles described audio-only podcasts, while 20 described podcasts with audio and some type of visual cues, which included still images or short video clips. The same study reports positive feedback

from students regarding a format with an entry-level physician asking questions to a more experienced physician, as well as a better listening experience with the interview format. Both the monologue and dialogue formats have also been reported[2].

For Ahn et al., the format can be a simple lecture or discussion between individuals that can provide a realistic and engaging dialogue for the listener[18].

Episode length

Prakash et al. classify podcasts based on their duration: short- (one to five minutes), medium- (six to fifteen minutes) and long-duration podcasts (more than fifteen minutes). The authors add that short podcasts are unique in that they can provide high-yield information in a short period[13].

Lomayesva et al. suggest an ideal duration of twenty to sixty minutes, with a weekly or monthly publication frequency. In the study by Chin et al., carried out with undergraduate students at MacMaster University in Canada, eighty-five percent of the participants declared their preference for podcast duration of 30 minutes or less, the same observed in the study by Lien et al.[8,16].

In the review by Cho et al., the average length of medical podcasts was 18 minutes, with uniformly positive feedback in one study using 15 to 20 minute recordings, revealing that there was almost no interest in the content beyond 45 minutes in this group[2]. Recommendations, according to Wolpaw et al., regarding the length of educational podcasts range from 5 to 30 minutes in various commentaries and editorials[9].

Kapoor et al. report that the maximum satisfaction in their research was shown for the short and medium-duration podcasts, with the most dissatisfaction being related to the longer ones. The author adds that the longer podcasts attempted to cover more detail on topics, resulting in reduced concentration, and it was more difficult for students to engage with the longer podcasts[19].

There seems to be some consensus that these podcasts should be relatively concise (perhaps less than 20 minutes), an idea also advocated by Prakash et al., who recommend keeping the duration of podcasts under fifteen minutes, considering the attention span of listeners[13].

Activities performed during a medical podcast

Podcast use, as reported by Malecki et al., has often been described as a way to optimize efficiency by injecting education into mundane or routine tasks such as commuting, cooking, and cleaning, providing an easy and engaging learning experience at times not usually used for studying[6].

Wolpaw and Toy suggest that there is a demand for podcasts among the assessed students and that the ones who listen to them do so frequently and value them, because they support multitasking and provide flexible access to pertinent information. The same authors state that the popularity of podcasts may be due, in part, to the fact that medical residents are struggling to find ways to balance learning, service, and their personal lives, allowing them to learn while exercising or commuting, without adding any additional time to their already hectic day[9].

In the study by Chin et al.,, the reported activities that participants performed while listening to podcasts included driving, exercising, doing household chores, just listening to the podcast, and eating[16]. The same activities were mentioned in the study by Lien et al., who reported a beneficial effect of exercising while listening to podcasts, which may positively influence cognition and learning[8].

For Wolpaw and Toy, students retain more information when they are doing something mindless that does not require higher-order thinking skills and studies have shown that aerobic exercise, especially immediately after learning, increases retention, reiterating the observation by Lien et al.[8,9].

According to Riddell et al., the various contexts in which residents listen – often while exercising or driving – may decrease their ability to learn, highlighting the contradictions still present in the literature on this subject[15].

Evaluation of student learning

In the review by Cho et al., most students reported that podcasts are useful for learning and easy to be used. There are articles that detail an improvement in test scores when podcasts were used, although some studies used a control group for comparison[2].

There are articles that reported educational outcomes. Following Kirkpatrick's stratification, the vast majority of papers evaluated in the review assessed satisfaction, followed by knowledge acquisition and impact on clinical practice. These were assessed primarily through surveys using Likert scale items, multiple-choice and open-ended questions[2].

The study by Back et al. compared student learning outcomes with podcasts and textbooks under laboratory conditions in the field of orthopedics. In that work, podcast users scored significantly better on post-tests ($P < 0.021$) and achieved significantly greater knowledge gain compared to text users ($P < 0.001$), showing significantly higher knowledge gain and higher satisfaction when learning with podcasts compared to textbooks among students[20].

Similarly, Wolpaw and Toy found that anesthesiology residents and medical students showed greater improvement in interpreting electroencephalograms after listening to a podcast on the subject than a control group that received only a traditional didactic session[9].

Quitadamo et al. showed that physicians prescribed fewer proton-pump inhibitors after using the podcast than before the podcast. However, the extent of behavior change correlated to the podcast was not statistically significant when compared to conventional training through written synopses[21].

Suggestions

In the study by Chin et al., the majority of students stated that a summary at the end or visual aids to accompany the discussion would help them retain the information. They also reported that they liked podcasts that were conversational, clinically relevant and included case discussions[16].

In the review on the topic by Cho et al. in 2016, which evaluated 84 articles, the interview format, clear disclosures, and accurate information were reported as desirable, while disapproving of podcasts that did not allow students to ask questions to the faculty[2].

The study by Lien et al. suggests including summary handouts and practice questions when possible[8].

The study by Riddell et al. evaluated through a qualitative approach the experiences of American and Canadian emergency medicine residents with educational podcasts. Interpolation questions, repetition of key points, short segments, interview style, a casual tone, and written program notes were seen as features that appealed to listeners[15].

Participants in the study by Riddell et al. expressed a preference for short, well-produced podcasts, in which they heard multiple perspectives on clinically relevant topics.

Their use as a practical and valuable resource to provide more consumable information such as journal articles, the fact that it allows the clinical community to share ideas globally, and the teaching of procedural tasks through video resources are pointed out by Singh et al. as relevant advantages of podcasts in health education[11].

The study by Kapoor et al. explores the importance of an enthusiastic attitude throughout the presentation, which ensures the student's concentration is maintained and adds that the presentation can be seriously affected by the presenter reading from a script and therefore, it should be avoided. They also point out that a podcast conducted by a professional interviewer creates a conversation that sounds more natural, making it easier to maintain the listeners' engagement[19].

DISCUSSION

Developing a medical podcast

Patrick et al. report on the development of PediaCAST, aimed at providing pediatric educational content, starting by defining the target audience. Planning the episodes followed a typical sequence: define the topic, write the learning objectives and interview questions, research the content, gather references and resources, and create a four-question post-test[12].

Traditional pre-publication peer-review has long been the gold standard of quality in printed journals. The absence of peer-review is often cited as a major weakness of digital self-publishing platforms, such as blogs and podcasts[22].

In 2015, Lin et al. assembled an international cohort of professional health educators to identify quality indicators for medical blogs and podcasts. Quality indicators classified in the domains of credibility, content and design were created, being considered useful tools in the creation of a podcast with medical content[22].

Regarding the domain of credibility, initial questions to be taken into account for the development of a medical podcast have been cited, such as: DId the authorities that created the resource list their conflicts of interest? Is the information presented in the content accurate? Is the identity of the author of the resource clear? Does the content make a clear distinction between fact and opinion? Does the feature clearly differentiate between advertising and content? Is the feature transparent about who was involved in its creation? Does the resource cite its references? Are the features consistent with their references? Is the author well qualified to provide information on the subject[22]?

As for the content domains, it is important to ask: Is the content of this educational resource of good quality? Is the content of this resource relayed by its author? Is the resource useful and relevant to the target audience? In view of the above questions, it is possible to identify whether a given topic has relevant and adequately qualified contents to be provided as a podcast to the public in the health area[22].

Finally, the domain of design also stands out, in which it is essential to question whether the resource employs technologies that are universally available to allow students with standard equipment to have access to the software[22], in order to ensure accessibility in a simple way to the target audience.

Ahn et al., in their study published in 2016, described a step-by-step guide on how to create a medical content podcast. At first, the stages for the development of the podcast were divided into six steps. The first step is to identify the needs that are currently unmet to choose a niche. The next step includes developing a plan for the podcast, determining its format, duration and frequency. The third step is about creating a recording environment, in which it is important to choose a quiet location with little ambient noise, and to use a high quality microphone. Step four is the actual recording and editing of the podcast. Editing is the key to remove unnecessary sounds, pauses and content, as well as adding sound effects

and overlaying music tracks to create a more professional sound. The next step involves hosting the podcast. The last step is about sharing the podcast on podcast directories and other social media sources, so that it can finally be accessed and enjoyed by the public[18].

For Singh et al, a consensus was established determining that the following factors are important to define a successful podcast series: duration of the existence of the podcast, number of monthly episodes, ratings by users and number of downloads / number of reproductions. For the authors, it was clear that a key element in assessing the quality and impact of a podcast is user feedback[11].

Podcasts are a complementary tool in health education. The role of podcasts as a primary source of knowledge was questionable in the past. In combination with other methods, podcasts have shown to improve learning outcomes[19]. The consensus for Prakash et al. is that podcasting should be used to supplement rather than replace traditional teaching for a richer learning experience[13].

Chin et al. envision the teaching through podcasts as a complement in health education, as well as to fill specific gaps that may be identified[16]. Prakash et al. suggest the possibility of using it as a preparatory tool for the flipped classroom strategy, a concept also addressed and advocated by Ahn et al[13,18]. For Kapoor et al, the feedback from their research participants highlighted "overview of information" and "use of images" as the strengths of the resource, and that students recognize podcasts as an effective method of self-directed learning[19].

Hassan et al. recommend the use of podcasts as an efficient way to learn that should be given more prominence in medical school curricula. Patrick, Stukus and Nuss in their article, also support the development of future podcasts focusing on health education[12,23].

Wolpaw and Toy advise that managers of medical residency programs in anesthesiology should consider offering the material in podcast form, because recording and distributing podcasts cost relatively little and recording a podcast takes only a little more time than giving a lecture and add that if it is publicly posted, it can benefit a much wider audience than a group of residents in a classroom[9].

CONCLUSION

Using podcasts in informal settings may limit their impact, as it is not known how engaging in simultaneous tasks affects learning. Little is known about how the information from the podcast is retained and applied after longer periods.

More rigorous studies that evaluate effectiveness, changes in behavior, and changes in patient outcomes need to be conducted to prove the value of podcasts in the medical field, as well as to understand how podcasts compare to traditional educational modalities in terms of learning outcomes. There is a need for more validation studies of podcasts against the gold standards of health education teaching.

As observed in our study and reported in the current literature, the medium is promising as a complementary tool to traditional teaching methods, and educators should focus on developing evaluation processes for this technology and refining evidence-based guidelines for creating new podcasts.

AUTHORS' CONTRIBUTIONS

Carol Anne da Silva Fernandes and Larissa Xavier Santiago da Silva Vieira: article writing, study conceptualization, validation and methodology. Francisco Theogenes Macêdo Silva, Marcos Kubrusly and Kristopherson Lustosa Augusto: study supervision, formal analysis and project management.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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